

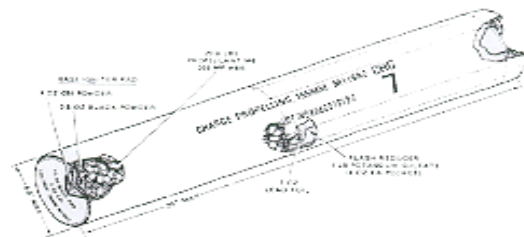
Propellant Surveillance

The Propellant Surveillance Group performs complex aging and analytical testing of solid propellant to determine its stability and safe storage and service life. EWD maintains an inventory of over 6,000 propellant lots that are loaded into the Army's munitions worldwide and provides life cycle testing for the Single Manager for Conventional Ammunition to identify potentially hazardous propellant lots and have them removed from the stockpile before an autoignition can occur. Over 180,000 propellant lots have been monitored since this function was established at ARDEC in 1921. We perform testing for the tri-services as well as other government agencies, private industry, and academia. ARDEC is the site of the Army's only laboratory dedicated to propellant analysis and testing. Business areas include:

- Chemical analysis using High Performance Liquid Chromatography to determine stabilizer content, percentage of nitrate esters such as nitroglycerin and DEDGN, as well as chemical composition.
- Accelerated aging studies, such as the Safe Interval Prediction (SIP) Test, to determine nitrocellulose degradation rate and stabilizer depletion rate. This test developed by EWD is unique as it is the first predictive test method employed in propellant surveillance.
- Compatibility studies to determine compatibility of propellant formulations with other energetics, metals, plastics, adhesives, and other ammunition components.
- Environmental conditioning studies to determine the effect of storage conditions on the service life of propellants and ammunition.
- Custom synthesis of propellant stabilizer standards that are no longer commercially available and development/design of new propellant test methods.
- Investigation of accidents or malfunctions involving both bulk and loaded propellant formulations to determine cause.
- Training in propellant safety, handling, and chemical analysis.
- Demilitarization support. Perform initial stabilizer analysis and conduct ongoing stability monitoring of propellant/ammunition items in long term demilitarization programs.
- Data library containing Hazardous Component Safety Data Statements, chemical formulas, and stability test data for every propellant formulation and lot tested at ARDEC since 1921.



Three dimensional spectra produced by the photodiode array spectrophotometer are used to assure that complete separation of propellant stabilizer reaction products is achieved when analyzing propellant using HPLC. This tool is essential to the ongoing methods development in support of the Army's propellant assets safe life assessment.



Ammunition items are torn down, inspected, and thoroughly examined prior to removing the propellant and igniter for analysis. The physical examination provides insight into the environmental effects that the propellant has been subjected to over time as well as identifies any defect or damage.



Gas chromatography is used to determine the moisture and total volatiles present in the propellants. These values are crucial as variation in either will affect ballistic performance.